

**Physics 131: General Physics I**  
(Spring 2017)  
**MWF 10:00 – 11:50 am; Science Center 0506**

---

**Instructor:** Eugenio Ursino  
Science Center 1131; x3021; ursinoeu@grinnell.edu

**Office Hours:** M 2-3pm, Tu 10-11am, Th 10-11am, and by appointment (see Weekly schedule on P-web or my door)

**Class Meetings:**

This course follows the Workshop Physics model, inspired by a new approach to teaching introductory physics developed by Prof. Priscilla Laws of Dickinson College. The Workshop approach disposes of the Lecture and Lab dichotomy of the conventional approach to teaching introductory physics. As such, we will not have formal lectures and you will use the class meetings for hands-on investigations of topics generally covered in the first semester of college physics.

**Textbook:**

There is no required textbook for this course. The relevant material will be provided for you in the form of Activity Guides, developed by our own Mark Schneider right here at Grinnell. However, **you are strongly encouraged to use introductory physics textbooks as references** for homework and to clarify your understanding of materials covered in class. There is a small library of physics texts in the lab.

**Assignments and Exams:**

**Activity Guides and Problems of the Day:** The course will be anchored in a set of handouts called activity guides. Activity guides give concrete instructions for what you do in class. You are required to complete the section of the activity guide relevant for the day, write your solutions and thoughts in the spaces provided, and hand them in. *Do not let yourself fall behind!* If you cannot complete the activity guide during the class period, you will be asked to complete it before the next class. This is important because you may not be able to understand materials covered in the next class period without completing the previous activity guide. Along with a session of an activity guide, you will also work out a problem each day, called the *problem of the day*. You should purchase a loose-leaf binder to hold these materials. **The activity guides and the problems of the day will be examined for completeness and accuracy.**

Much of the work that we will do depends on the use of the Macintosh network in the Workshop Lab. If you are unfamiliar with computers in general or the Macs in particular, or Microsoft Excel, this is not a problem, but you will need to become familiar with them very quickly. You can request some exercises and handouts that will help you do that.

Activity guides and your in-class work are done in your working group, typically consisting of three students. This collaborative character of in-class activities requires that you come to class every day and on time, work well with your partners and have a strong sense of commitment to your group.

**Note:** Class participation is an essential component of the course. If you need to miss class for a valid excuse (illness, family emergency, etc), please email the instructor before the class period. You will get a blank copy of the activity guide and will need to complete it on your own. You will not be able to pass the course if you miss more than 3 class meetings without prior consent of the instructor.

**Homework:** Homework problems will give you an opportunity to further synthesize what you discover through in-class activities into a formal knowledge structure. I have therefore made your homework average an important part of your semester grade. I encourage you to consult your fellow students, teaching assistants and me for help in solving homework problems. You may use textbooks to aid your understanding. You may not, however, consult solution guides (for example, the solutions manual from the publisher, from prior semesters of this or other courses, or online resources that provide solutions). What you actually hand in must be in your own words and reflect your understanding of the problem. Late homework will not be accepted, unless cleared with me 24 hours in advance.

**Quizzes, Midterm Exams and Final Exam:** We will have two midterm exams and a cumulative final exam. One week before each midterm exam, there will be a quiz that covers the exact same material as the corresponding exam. The midterm exams and quizzes will be held during the regular class period on the dates specified in the attached semester schedule. Final exam will be held at 2:00 pm on Thursday, May 18. Make-ups for missed quizzes and exams can only be granted under exceptional circumstances (medical emergency, official university business, etc.). If you know of such impending circumstances, please contact me in advance.

**Grading:**

Your grade for different components of the course will weigh as follows:

Activity Guides and Problems of the Day:	15%	
Homework:	15%	
Quizzes:	5% each	(10% total)
Midterm exams:	15% each	(30% total)
Final Exam:	30%	

**Disability Accommodations:**

Any student with a documented disability needing academic adjustments or accommodations should speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities are also encouraged to contact Autumn Wilke, Coordinator for Disability Resources.

**Religious Holidays:**

Grinnell College offers alternative options to complete academic work for students who observe religious holy days. Please contact me within the first three weeks of the semester if you would like to discuss a specific instance that applies to you

## Anticipated Schedule

Date	Topic
Jan 23	Motion and calculus
25	
27	Freefall and acceleration
30	
Feb 1	
3	Newton's laws
6	
8	
10	Energy and momentum conservation
13	
15	
17	
20	Motion in multiple directions
22	
24	<b>Quiz 1</b>
27	
Mar 1	
3	<b>Exam 1</b>
6	Circular motion and angular momentum
8	
10	
13	Oscillations
15	
17	Waves in one dimension
<i>Spring Break, No Class, Mar 20-31</i>	
Apr 3	
5	
7	Waves in multiple dimensions
10	
12	Introduction to quantum waves
14	Bound quantum states
17	
19	Atoms
21	<b>Quiz 2</b>
24	
26	
28	<b>Exam 2</b>
May 1	Statistical Mechanics
3	
5	
8	
10	
12	Practice Exam/Review
<b>Final Exam, 2 pm Thursday May 18</b>	

## Tips for Success in Workshop Physics

It is no secret that the minimal demands of this course are not outlandishly taxing, at least compared to other science courses with laboratories. Since there are no outside readings, and some students find they are able to complete much of their homework at the end of their activity guide work in class, there can be little required work outside of the six class hours. This was not an oversight in the design of the course. If you do this minimal work, you are very unlikely to fail, but you are also unlikely to do well either. So how should you study in a course with no text?

First, make sure you show up regularly, on time, and work with your group. This is a rare opportunity to have the professor and one or two TA's nearby for 6 hours a week while you are learning the material so you can clear up confusion promptly. Try to pace yourself so you get through the material, but not in such a rush that you can't ask those questions. Ideally, leave yourself five minutes or so at the end of class to look over the homework assignment and ask questions about it.

Second, pick up your graded activity guides promptly, and review them before you start your homework. Each session has a particular focus, in general--see if you can summarize what that focus was, and what the important results were. You might want to make your own summary of each session in your own words, including relevant results and equations. The activity guide will have notes on it where we believe you were confused. Make sure you clear up those confused points before you start your homework, especially if they relate to the homework question! Good resources are: your group members, or other class members, or the professor and TA's, or the texts on the shelves in the Workshop Lab, or physics majors you might know.

Third, make sure to do, or at least attempt your homework before the following class. The homework should be a good guide for whether you understood the activity guide session, and should let you know what problem solving skills we expect you have gained from the session. If there are items that are still confusing, even after reviewing the activity guide, you can ask about them in that following class--the beginning of class is a good time for this. The homework is due that day, but you can even hand it in the next class session at no grade penalty.

Fourth, really study the summary sheets when they come out every couple of weeks or so. Make sure that you are familiar with all the concepts and equations presented on the sheet. If you feel at all shaky on any of them, review the activity guides and relevant homework. Then find some similar problems in one of the text references that we have (preferable with a solution in the back) and test your ability to do those problems.

Fifth, make sure to talk with your professor when you feel you do not understand something despite reasonable effort. Often a few minute conversation with the professor can clear up a confusing concept that otherwise can provide a brick wall roadblock for you for hours!

## Selected Greek Letters

$\alpha$  Alpha

$\gamma$  Gamma

$\epsilon$  Epsilon

$\kappa$  Kappa

$\mu$  Mu (pronounced "myu")

$\pi$  Pi

$\tau$  Tau (pronounced either so as to rhyme with "cow" or to rhyme with "raw")

$\omega$  (lower case)

$\sigma$  (lower case)

$\psi$  Psi (pronounced with or without the "p", followed by "sigh")

$\beta$  Beta

$\delta$  (lower case)  $\Delta$  (upper case) Delta

$\phi$  Phi (pronounced either "fie" or "fee")

$\lambda$  Lambda

$\nu$  Nu (pronounced like "new")

$\theta$  Theta

$\Omega$  (upper case) Omega

$\Sigma$  (upper case) Sigma